

CyberPower

Hybrid PV Inverter

Installation & User's Manual

CPSHB6000ETL48



Ver. 1.0

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1 Safety

1.1 Intended to Use

This product is a Hybrid PV inverter for Energy Storage System (ESS) that converts direct current (DC) from PV array into battery and/or Grid alternating current (AC). During daytime, PV power balances load and store the remaining PV energy to battery, converts battery energy to Grid to balance load consumption during night or insufficient PV power (refer to Fig. 1-1 a). Another application is charge battery from lower electricity rate and discharge when higher electricity rate (Fig. 1-1 b). This device can be installed indoor only.

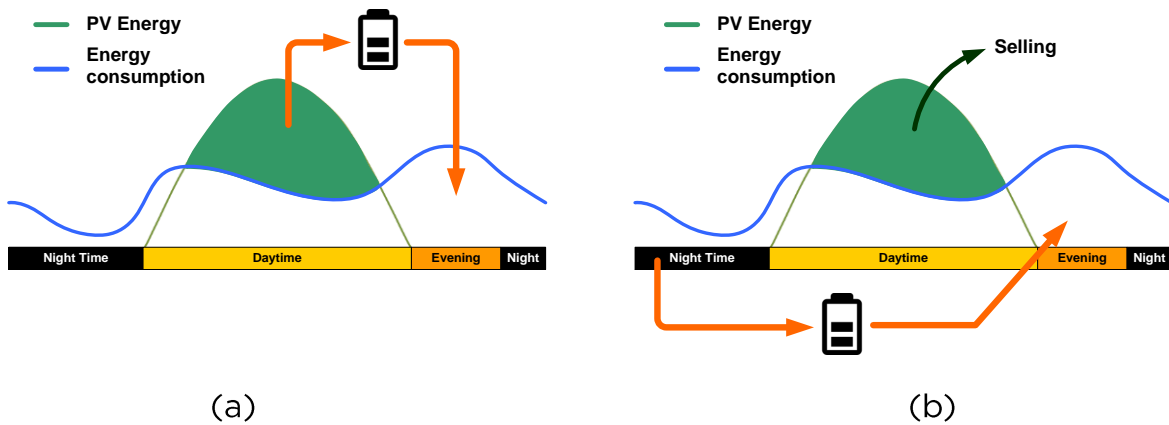









Fig. 1-1 System working diagram

The PV input ports must only be connected to PV strings instead of battery or other kinds of DC sources. Either for Battery input ports can only be connected to battery.

1.2 Symbols on Equipment





The following warnings and symbols are used on the equipment (inverter)


Symbol	Description
	Risk of electric shock The inverter operates at high voltage. All work on the product must be performed by qualified persons only.
	Risk of electric shock after isolation After disconnecting the inverter from all power sources, wait the indicated time before doing work on the equipment. If not avoided, can result in injury or death.

	Warning Install the equipment according to the instruction, or may result in injury or equipment damaged.
	Hot surface The inverter surfaces can get very hot. Touching the surface can result in injury due to heat.
	No isolation transformer The inverter is not isolated between DC input and AC output.
	Read the instructions It is mandatory to read and observe the manual and instructions.
	Grounding conductor Indicates the position for the grounding conductor terminal.

1.3 Safety Information

In order to prevent personal injury or property damage and to ensure long-term operation with the inverter, please observed all safety information in this section.

Symbol	Description
	Risk of electric shock Indicates dangerous electrical conditions, can cause injury and/or death if not avoided.
	Warning Indicates a hazardous non-electrical conditions, can cause injury, death and/or damage to the property or equipment if not avoided.
	Notice Indicates a hazardous non-electrical conditions, can cause damage to the equipment if not avoided.
	Information Indicates important information to ensure the system work normally. Not safety-relevant.



WARNING! High voltage from PV strings
When PV modules are exposed to sunlight, dangerous high DC voltage is present in the DC connectors.

- Do not touch the DC conductors, include the uninsulated cable ends.

- Do not disconnect the DC connectors from the equipment under load. An electric arc may occur and lead to electric shock and burns.
- Before doing any work on the inverter, disconnect the inverter from all power sources and wait for 5 minutes at least.



WARNING! High voltage due to ground fault

If ground fault occurs, uninsulated components may present high voltage. Touching the live parts may cause electric shocks.

- Before touch the inverter metal parts, always disconnect the equipment from all power sources.



WARNING! Hot surface

The surfaces of the equipment may get very hot while operating and need tens minutes to cool down after shutdown.

- Do not touch the hot surface.
- Wait half hour for the surfaces to cool down before doing work on the equipment.
- Observe the requirements of mounting.



WARNING! Heavy equipment

The inverter is heavy, can cause injury if drops to somebody

- When mounting the equipment, 2 persons to lift and mount it.
- Securely mount the equipment on a solid wall.
- Observe the instructions of installation.

2 Introduction

2.1 Applicability

The manual is applicable to these products

- CPSHB6000ETL48

2.2 Scope of Delivery

Check the goods of delivery for completeness and any visible damage. Contact your distributor if any good of delivery is incomplete or damaged. Refer to Fig. 2-1 for unpacking the package.

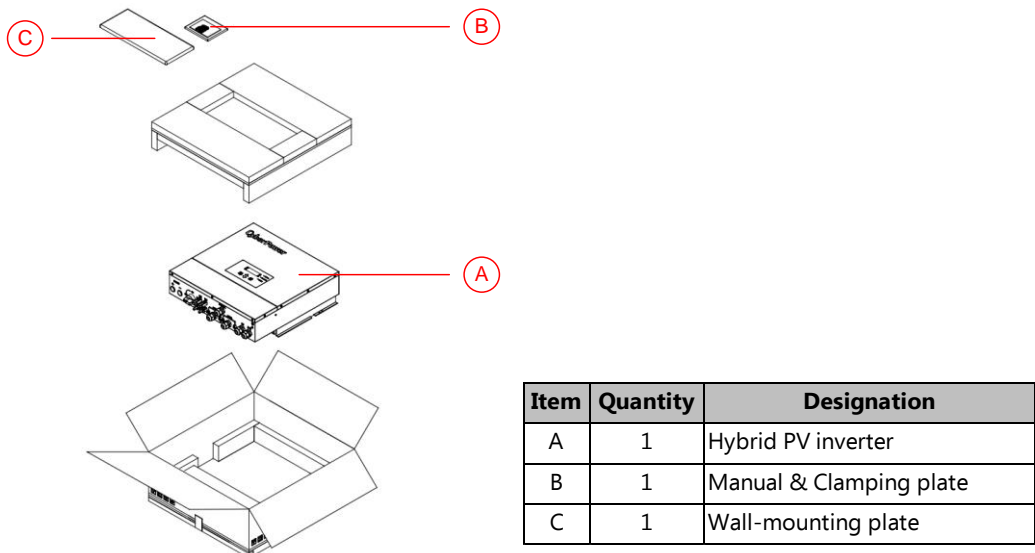


Fig. 2-1 Unpacking and contents

2.3 Exterior Overview

This device is a single phase Hybrid PV inverter. PV to Grid is non-isolated (transformerless) and battery to Grid is galvanic isolated with HF transformer. If PV power is sufficient, PV power balances home consumption and store energy to battery. Once PV power is insufficient, home consumption power comes from battery, also from Grid if battery low or overpower.

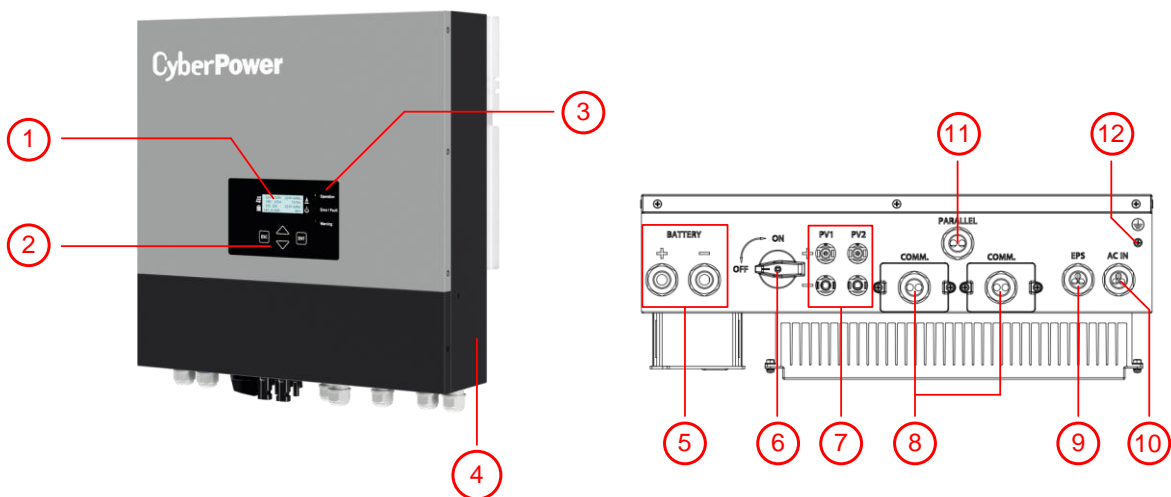


Fig. 2-2 Inverter exterior overview

Position	Function
1	LCD display

2	Touch buttons
3	LED indicators
4	Rating label
5	Battery connection
6	DC switch
7	PV connectors
8	RS-485 communication ports
9	Emergency power supply (EPS) port
10	AC input (Grid) connection port
11	Parallel connection port
12	Auxiliary grounding terminal

3 Installation

3.1 Installation Area



WARNING! DO NOT install the inverter:

- Near to a heat source. High temperature decreases the output power and service life of the inverter
- In a dusty place
- Exposed directly to sunlight
- Near flammable materials or gases
- In a place that can be touched inadvertently

You can only install the inverter indoor and meet the requirements in 3.3.

3.2 PV Array Consideration

PV modules require,

- Not grounded to the PV+ or PV- terminals
- Have IEC61730 class A rating
- PV cables are protection class II certified (double insulated)



WARNING! Check Voc of the PV strings

- Make sure the PV input voltage is always less than the max. input voltage rating of inverter at any conditions (Must consider the lowest ambient temperature condition)

PV string MPP voltage should be within the MPP voltage range of the inverter. It is recommended that PV capacity is within 0.8-1.2 rated output power.

3.3 Mounting the Inverter

Unpack the delivery

1. Before opening the package, check the label to make sure that the delivery is correct.
2. Take out the accessories and buffer packaging materials.
3. Move the inverter to the installation area (shall be executed by 2 persons).
4. Check the model name on rating label on product to make sure that it is the correct unit.
5. Read the instructions

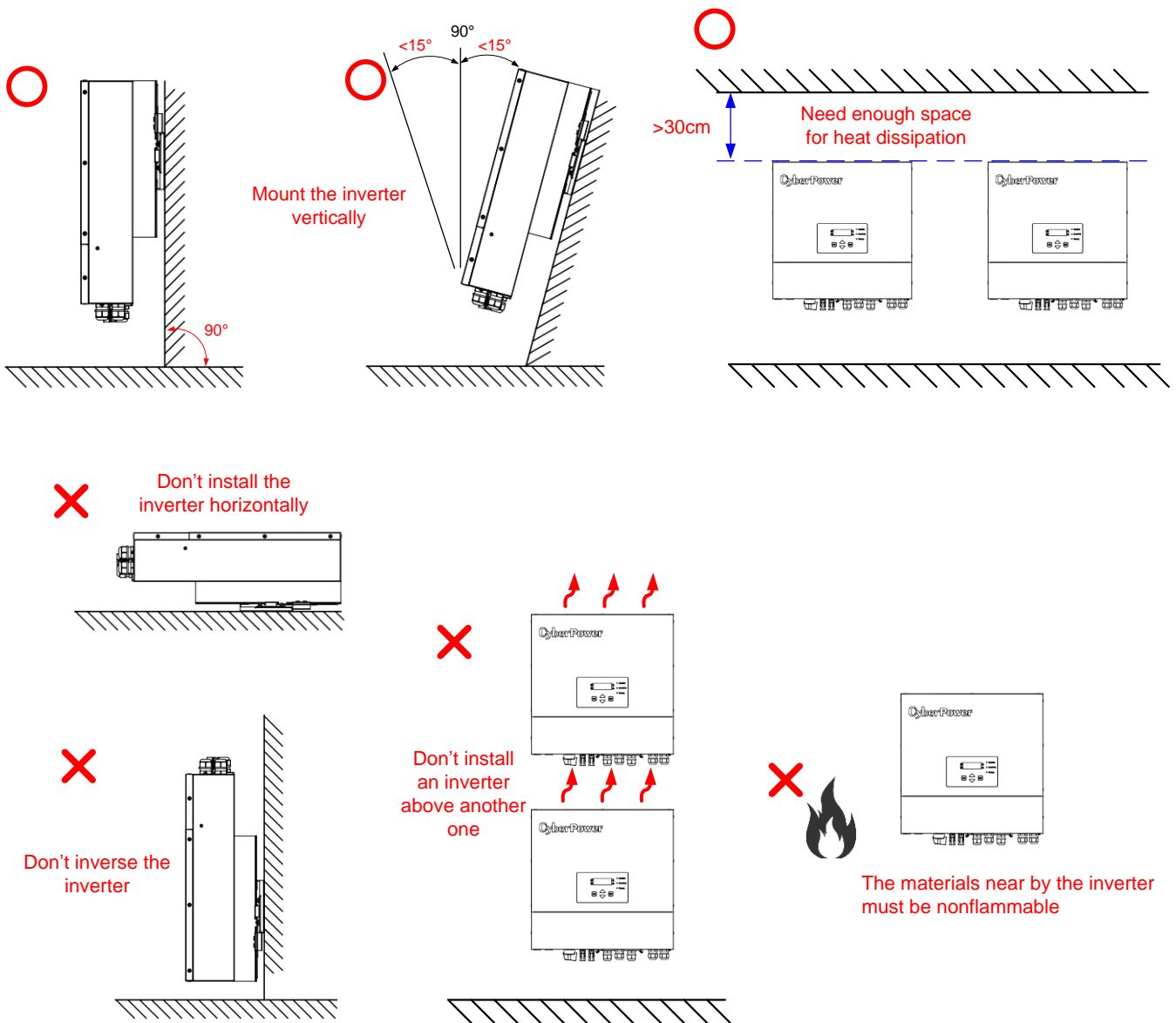


Fig. 3-1 Inverter installation requirements

Mounting procedure



WARNING! Mounting surface must be solid

Make sure that the mounting surface (wall, metal support, etc.) can hold the weight of the inverter

1. Make sure the clearance around the inverter after wall-mounted meet the requirements.
2. If necessary, drill holes on the wall and install anchors.
3. Use appropriate screws to fasten the wall-mounting plate to the wall surface.
4. Move the inverter slightly above and touch the wall-mounting plate.
5. Lower the inverter on to the wall-mounting plate.
6. Install and tighten M4 nuts to secure the clamping kit and inverter.

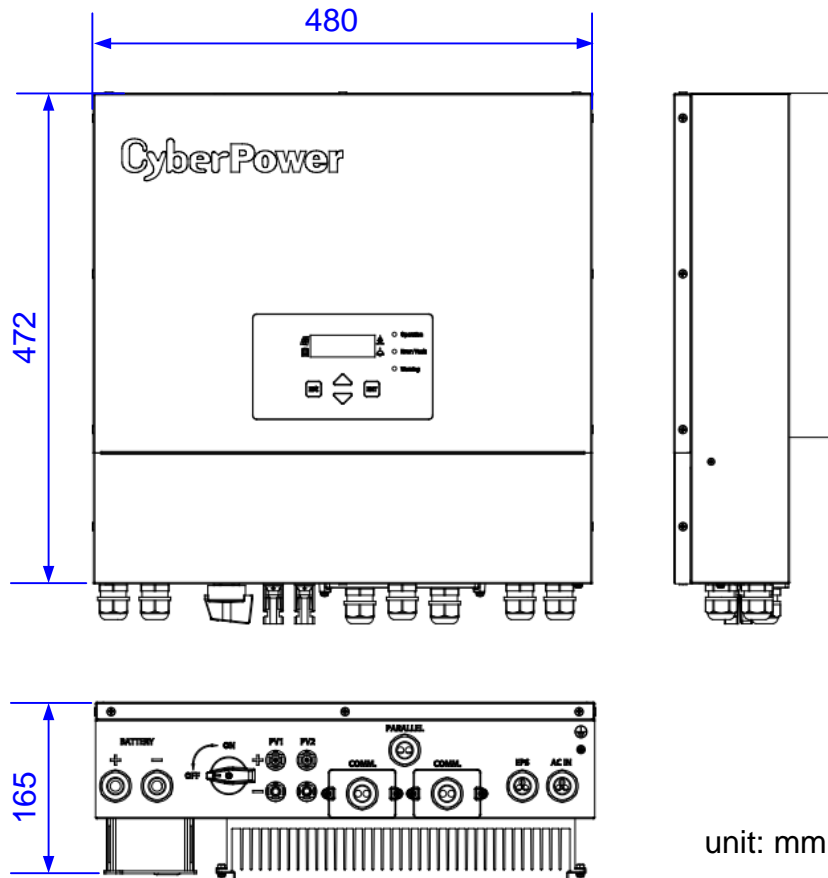
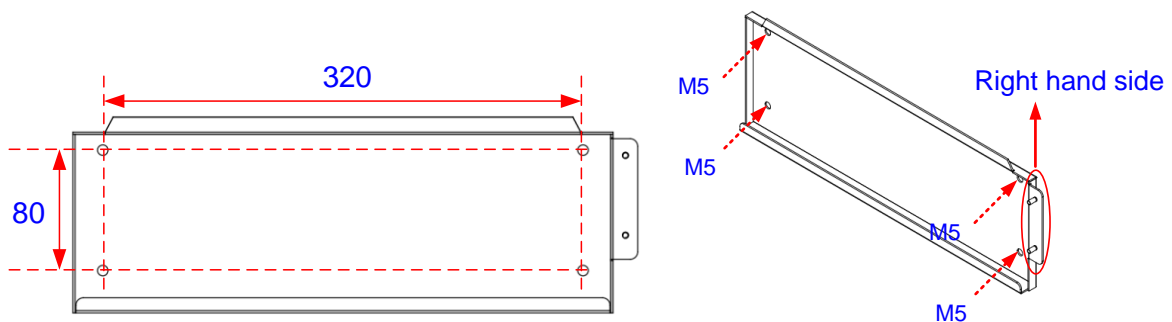


Fig. 3-2 Inverter dimensions



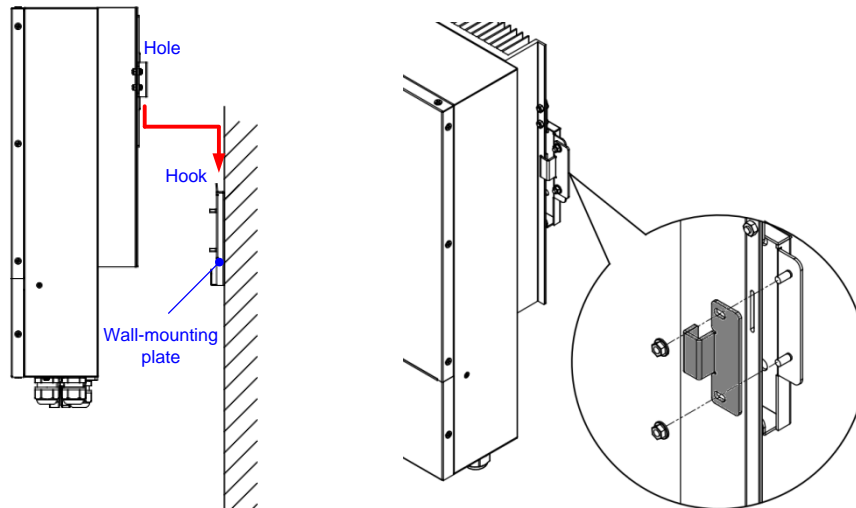


Fig. 3-3 Mount and fix the inverter

3.4 PV Input Wiring



WARNING! Check the polarities of PV strings

- Before connecting the PV strings, make sure that the polarities are correct.
1. Isolate the inverter from all power sources.
 2. Set the DC switch on the inverter to OFF position.
 3. Make sure all the PV strings are compatible with the inverter, and V_{oc} is always less than the max. input voltage rating at any conditions (consider the lowest ambient temperature condition).
 4. Connect the corresponding connectors of strings to the PV inputs of the inverter (make sure the +/- polarities are correctly connections). You can hear a click if connected well.

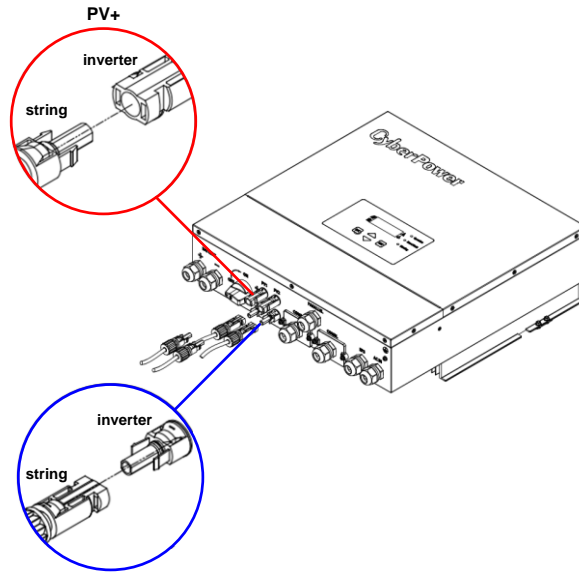


Fig. 3-4 PV wiring

3.5 AC Wiring



WARNING! Must install suitable circuit breaker for the inverter

- Installer must install a circuit breaker between inverter AC output and Grid mains.

Recommend AC breaker,

Port	Tripping type and rating
AC IN	Type B/C, 30A
EPS	Type B/C, 20-30A

Wiring procedure,

5.5mm² or 10AWG wire is recommended.

1. Isolate the inverter from all power sources.
2. Remove the wiring box cover and the cover of AC terminal.
3. Crimp the wires from Grid breaker with ring type terminal lugs.
4. Tightly screw the Grid wires on the corresponding terminals (refer to Fig. 3-5).

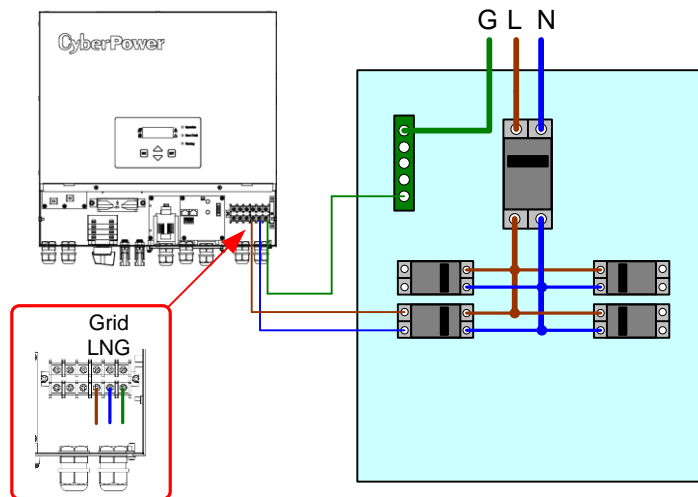


Fig. 3-5 Grid AC wiring

5. Crimp the wires that will be connected to emergency load with ring lugs.
6. According to local regulation, tightly screw the EPS wires on the corresponding terminals. EPS N wire has 3 kinds of connection and corresponding setting.
 - Floating, refer to Fig. 3-6, connects to L & N terminals. Must set EPS port as “Float” via display (Setup / EPS Port / N Wir.), AC bypass function can be enabled.
 - Connect to Grid-N, refer to Fig. 3-7, connects to L and N’ terminals. Must set EPS N wiring as “To G_N”. AC bypass function can be enabled.
 - Connect to Earth, refer to Fig. 3-8, connects to L and N terminals. EPS-N short to earth external by installer. Must set EPS N wiring as “To Earth”. AC bypass function would be disabled forcedly.

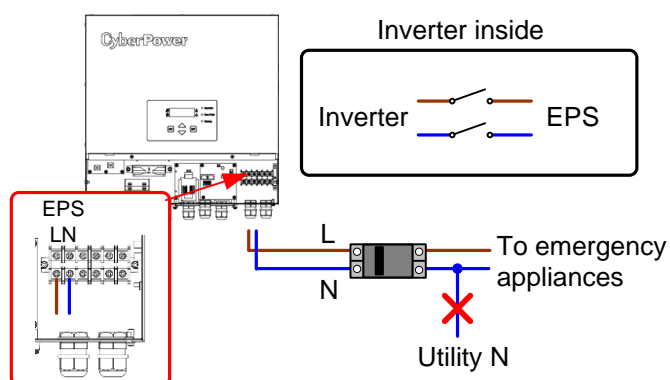


Fig. 3-6 EPS is floating

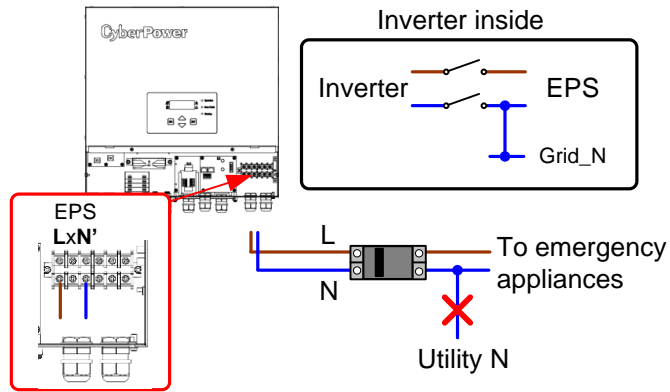


Fig. 3-7 EPS N connect to Grid N inside the inverter

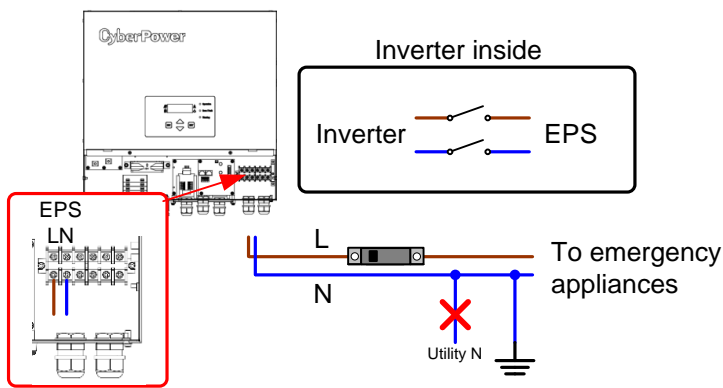


Fig. 3-8 EPS N connects to Ground

7. We'll install back the terminal cover and wiring box cover.

3.6 EPS Connection in Parallel Wiring

! WARNING! PV inputs must be separate between inverters
 If multi inverters EPS ports have to operate in parallel to provide larger power, PV inputs can't be parallel between inverters.

This inverter supports parallel operation up to 6 units, can be mono phase or 3phases. **Mono phase:** PV inputs must be separate between inverters. As for other wirings, please refer to Fig. 3-9.

- Battery must be connected in parallel between inverters (all inverters use same battery source).
- EPS must be connected in parallel between inverters. Don't use the AC terminal of inverter as the connection common point. Have to install a 20-30A breaker for each inverter, and another breaker between the inverter group and load.
- Communication connection, 1st unit connects to 2nd unit, 2nd unit to 3rd unit and so on, the last unit connect back to 1st unit (Fig. 3-11).

- Set up each inverter EPS port settings (refer to 5.2, Setup/EPS Port section).

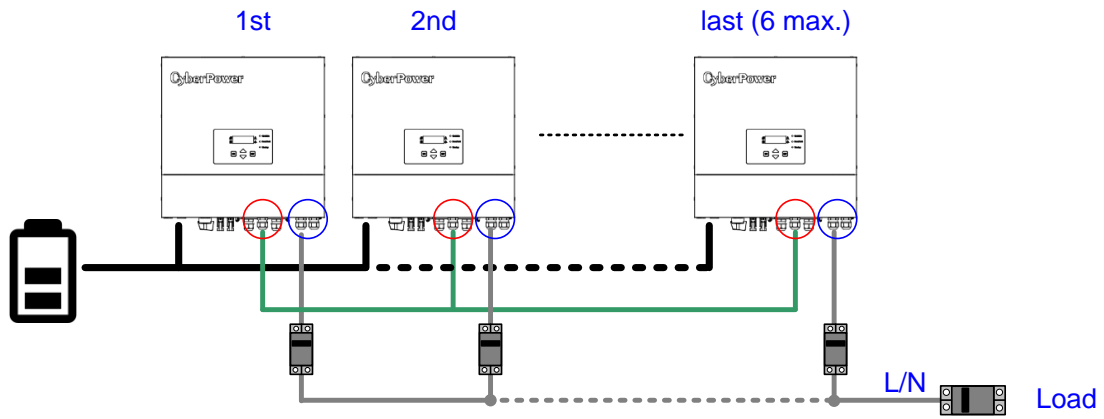


Fig. 3-9 Multi inverters in parallel of single phase

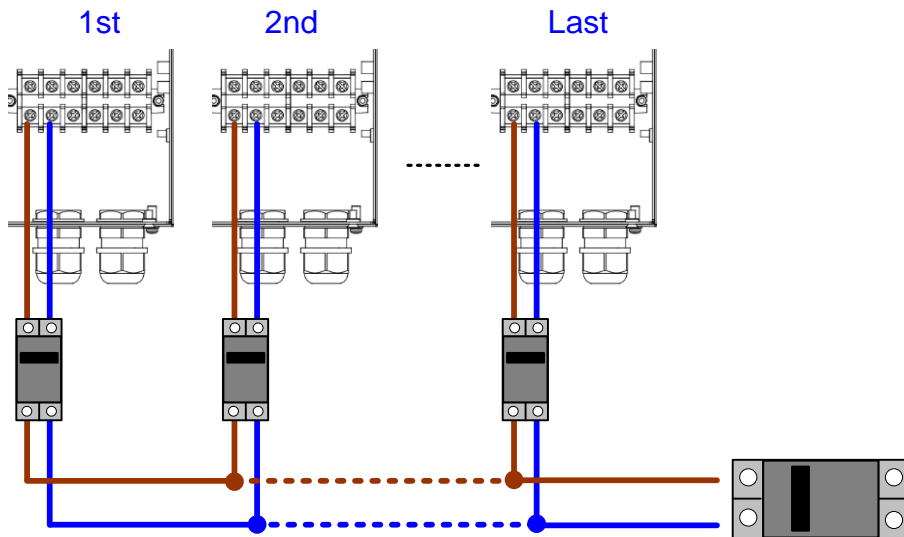


Fig. 3-10 EPS wires connection in parallel

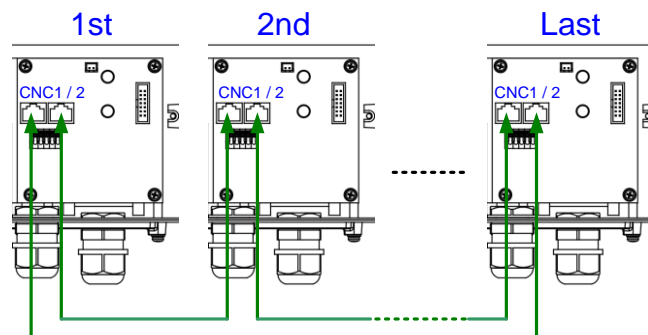


Fig. 3-11 CAN communication connections for operation in parallel

Three phases: PV inputs must be separate between inverters. As for other wirings, please refer to Fig. 3-12.

- Battery must be connected in parallel between inverters (all inverters use same

battery source).

- For 3-phase application, must install 3 or more inverters since each phase needs one unit at least. Max. 6 units in total, L1/L2/L3 configuration can be 2/2/2 or 1/2/2 or 3/2/1 units and so on. Refer to Fig. 3-10 for the wiring. Don't use the AC terminal of inverter as the connection common point.
- Communication connection, 1st unit connects to 2nd unit, 2nd unit to 3rd unit and so on, the last unit connect back to 1st unit (Fig. 3-11, same as mono phase).
- Set up each inverter EPS port settings (refer to 5.2, Setup/EPS Port section).

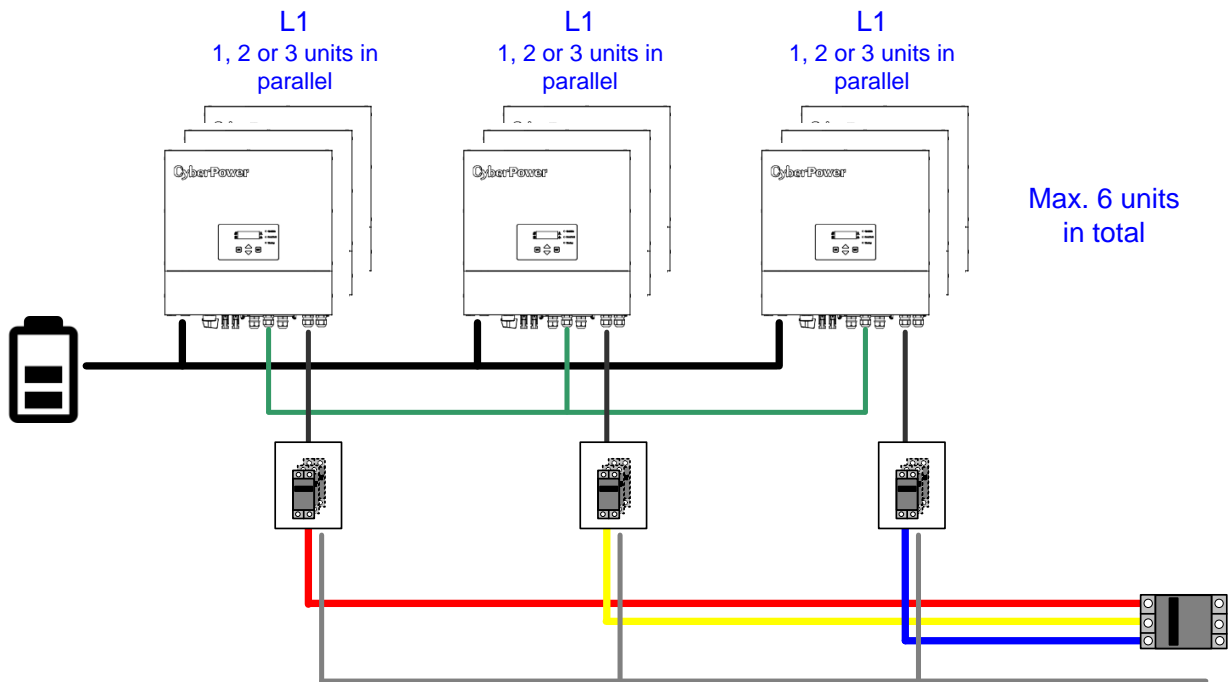


Fig. 3-12 Multi inverters in parallel of 3-phase

3.7 Battery Wiring

! WARNING! Check the polarities of battery wires

Before connecting the battery wires, make sure that the polarities are correct.

1. Isolate the inverter from all power sources.
2. Make sure the battery wires +/- voltage is nominal 48Vdc
3. Use a suitable DC breaker (75-100 Adc is recommended) for current protection. Connect the corresponding wires to Battery terminals of the inverter, make sure the +/- polarities are correctly connected to corresponding terminals. 2AWG (25mm²) wires is recommended.
4. If install VRLA battery, please refer to Fig. 3-13(a).
5. If install LiFePO₄ battery modules, please refer to Fig. 3-13(b), BMS communication is necessary (refer to 3.8).

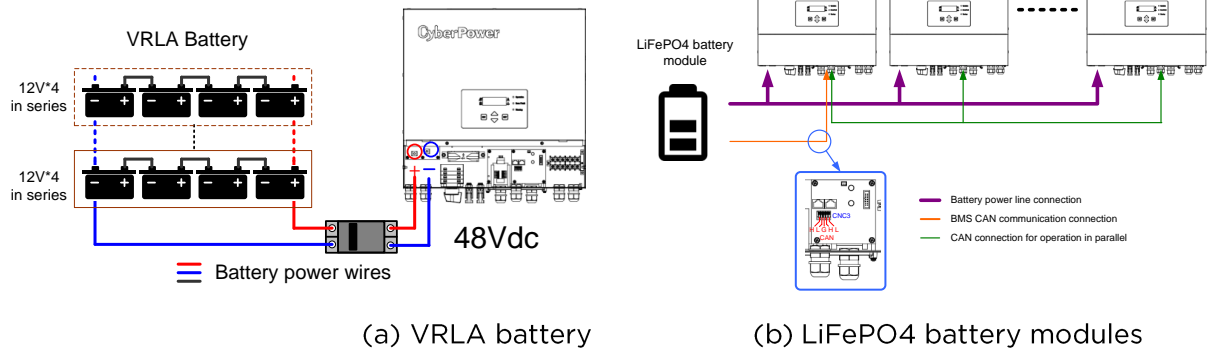


Fig. 3-13 Batteries wiring

3.8 Communication Wiring



INFORMATION! Use twisted pair wires for communication.

For reliable communication, please use twisted pair wires for the RS-485 and CAN communication

Unshielded twisted pair (UTP) cable is recommended to use for RS-485 D+/D- communication.

Procedure:

1. Loosen the 4 screws and remove the cover.
2. Loosen and remove the gland nut and rubber.
3. Remove 20mm of the outer jacket of cable.
4. Remove 10mm of the insulation jacket of one twisted pair conductors (ex. Orange/white and orange).
5. Install the wires in the appropriate terminals (D+ and D-).
6. If there're multi inverters, have to connect IN and OUT terminal in JR2 except the end one, refer to Fig. 3-14 for the RS-485 communication wiring. Switch on the terminal resistor (SR1) in the end one, but keep SR1 OFF in the other units.
7. If LiFePO4 modules are installed, have to build-up BMS CAN communication. Use UTP cables connect the CAN-H/-L from battery module to CNC3 pin1/2 or 4/5 of parallel board (Fig. 3-15).
8. Place back the cover and tighten it.
9. Put back the rubber and tighten the gland to seal the cable.

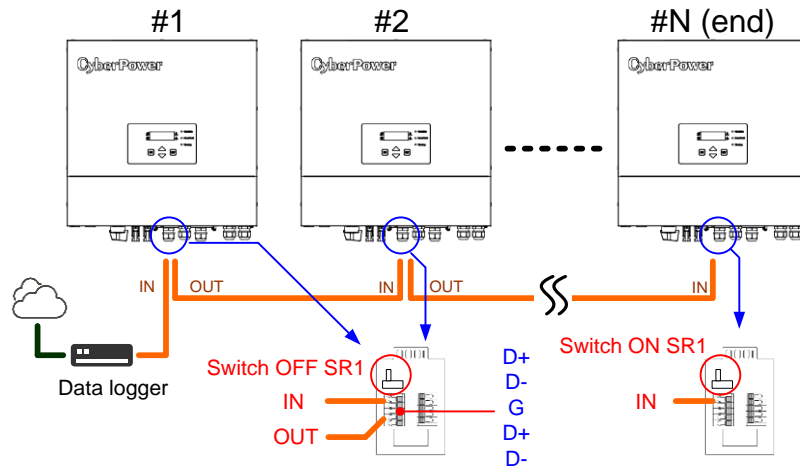


Fig. 3-14 RS-485 communication wiring

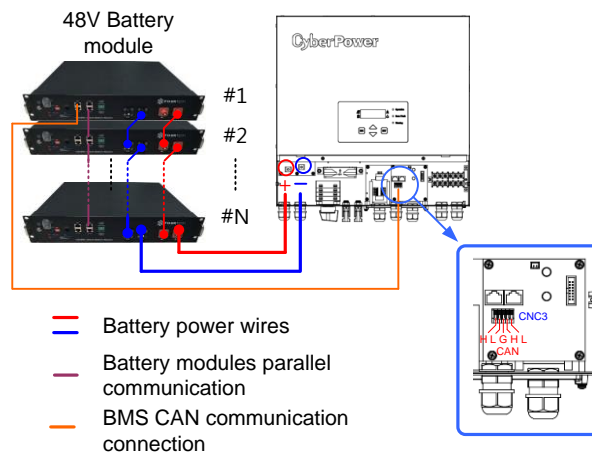


Fig. 3-15 BMS CAN communication connections

3.9 Self-consumption CT Wiring

These models support self-consumption function. With this function enabled, inverter only supports power to balance load and don't feed-in Grid. User has to install an external current sensor with 1000:1 / 100Amax, 2000:1/200Amax or 3000:1/300Amax rating (optional).

Procedure:

1. According to the requirement, if want to balance total consumption, place the CT to clamp the main line from Utility (ex. L in main distribution panel). **The CT direction must be from Grid to load** (refer to Fig. 3-16). If want to balance particular load, pace the CT to clamp the particular load line, don't have to care the CT direction since inverter measure the absolute power value (refer to Fig. 3-17).
2. Connect the CT signal wires to Interface board JR4, ensure the polarities are correctly connected. Support multi inverter use same CT, but have to parallel the

CT wirings and max. 3 units in parallel.

3. Enable self-consumption function, set up from display Configuration → Grid Settings → password → Self-Cons. → set up the settings below,
 - Function ON / OFF: Enable or disable this function.
 - CT On Main / Load: CT location, clamps on main or load.
 - CT Ratio 1000 / 2000 / 3000: Set up according to the CT spec.
4. During On-Grid operation, inverter would adjust output power automatically to balance house consumption if PV energy is sufficient. If work abnormal, please check the CT direction and settings.

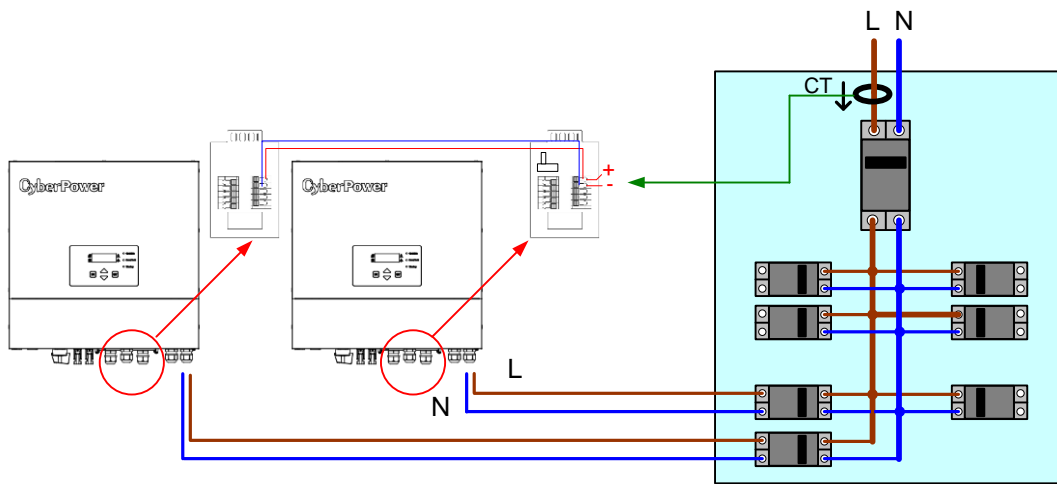


Fig. 3-16 Self-consumption wiring, CT on the main line

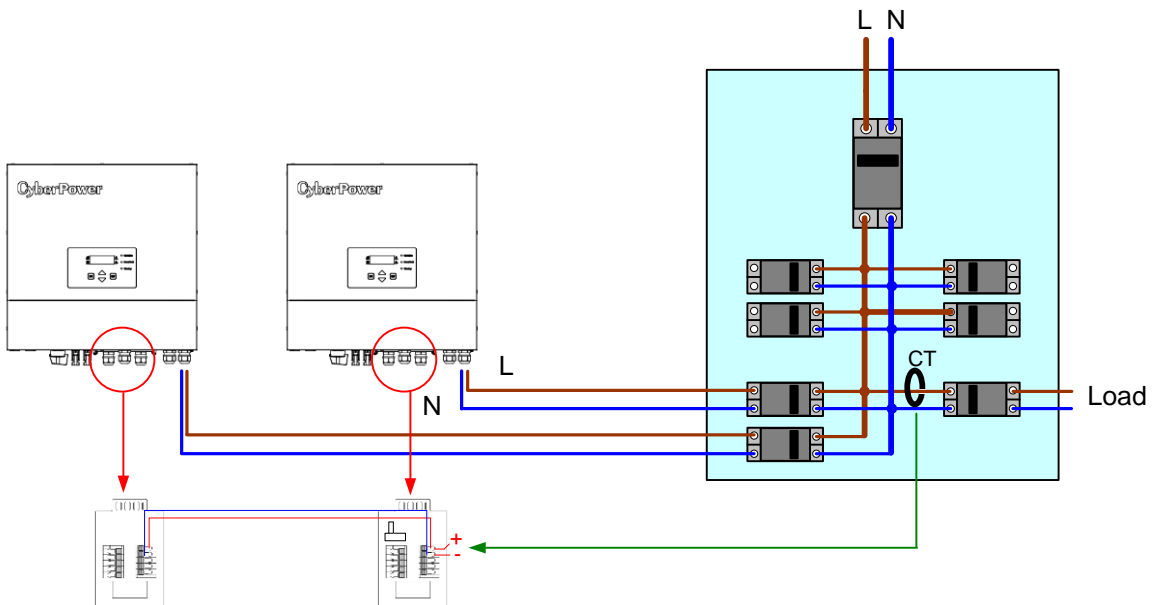


Fig. 3-17 Self-consumption wiring, CT on the load line

4 Start-up

Hybrid PV inverter provide multi-mode for user, there're "PV Inverter mode", "Balancing mode", "Charging first mode", "PV charge mode", and "Backup mode" operations. Explain as below,

- **PV Inverter mode:** Inverter works like Grid-tied PV inverter, have to set "Setup/Battery/Type" as "Non-connection". If don't want self-consumption function, have to set "Setup/Grid Parameters/Self cons/E_rem. to Grid." as "OFF"
- **Balancing mode:** PV energy highest priority is to balance home consumption, then, store the remaining power to battery. If PV energy is insufficient, the deficient power supplied by battery until SOC less then EOD setting (Setup/Battery/EOD normal). Have to set "Setup/PV Inputs/Energy Pri." as "Balance load"
- **Charging first mode:** PV energy highest priority is to charge battery, then, balance home consumption from remaining energy. In normal condition, AC doesn't charge battery unless AC charge schedule is active or SOC is too low for a while. Have to set "Setup/PV Inputs/Energy Pri." as "Charge Battery" and discharge schedule in "Setup/Battery/Discharge Schedule"
- **PV charge mode:** When Grid power outage or abnormal is occurring, inverter can't output power to Grid. In this mode, inverter disconnects from Grid, PV energy charge battery. Don't need to set up, inverter would enter this mode automatically.
- **Backup mode:** Battery or PV+Battery provide power to EPS port when Grid is abnormal. User can set inverter to transfer to this mode automatically or manually in "Setup/EPS Port/Output" as Auto or Manual. If Manual is set and Grid is abnormal, user have to manually turn on EPS power via display. If EPS connects to a motor and no other kind of load, set "Setup/EPS Port/Load Type" as Motor is recommended.

4.1 Display, LED and Buttons

The inverter can automatically operate when Battery or PV is powered on and settings are correct. At first start up, installer must set some necessary parameters, then, inverter can start to operate. It would automatically shut down at the nighttime and back to operate during daytime.

4.2 First Start-up

Procedure:

1. Make sure the PV strings have enough voltage (>200Vdc) and power

2. Make sure the Grid power is switch OFF
3. Turn on the DC switch on the inverter
4. Wait for few seconds and the display will show some information as below, set up the settings. Fig. 4-1 shows the display, LED indicators and buttons positions. Fig. 4-2 shows the 1st start-up setting procedures, please select the correct settings according to local grid code, battery type and priority. If set Priority as “Charge battery”, also need to set “Discharge schedule”.

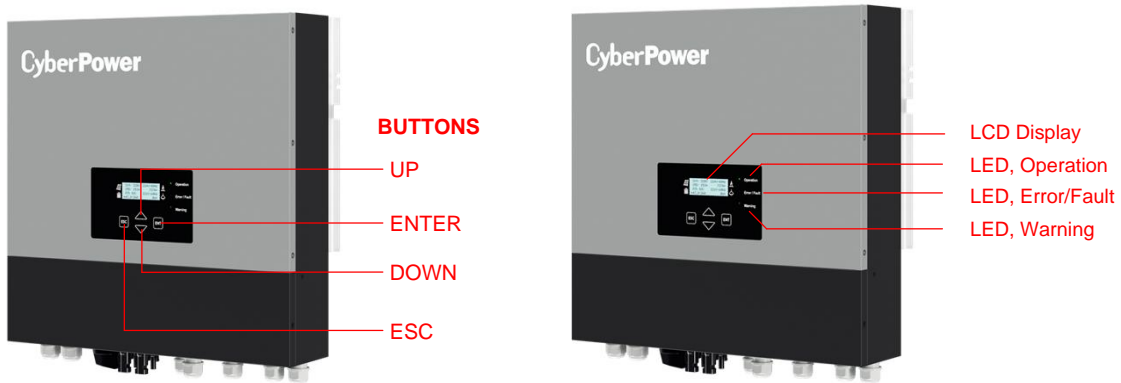


Fig. 4-1 Buttons, display and LEDs positions

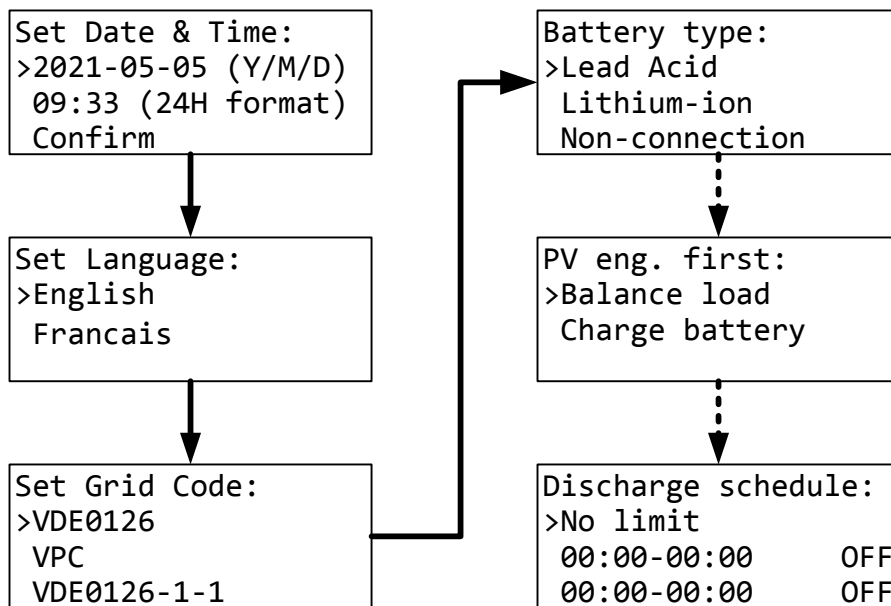


Fig. 4-2 Settings for 1st start-up

5. If there are multi inverters connect RS-485, must set up the ID for each inverter, Display Configuration → General Settings → RS485ID.
6. Turn-on battery power.
7. Display shows “No Grid” alarm since AC output is switched off, turn on the AC breaker.

8. Inverter will be doing some self-tests and countdown to connect to grid when passed self-tests and the Grid condition are within the operating ranges.

5 Operation

When all sources are power on and within the operating range, inverter would connect to the Grid automatically. User can check the basic operation by display, LED and/or RS-485 communication. For better DC switch life, if user wants to shut down the inverter, please switch off AC first, then, switch off DC switch.

5.1 Menu on Display

Fig. 5-1 is home page. Display goes back to this page when user didn't press any button for 3minutes. In this page, press any button can enter menu page, menu has "Meter", "BMS Info.", "Energy Log", "Event Log", "Device Info.", "Setup", and "Turn-off Inverter" items.

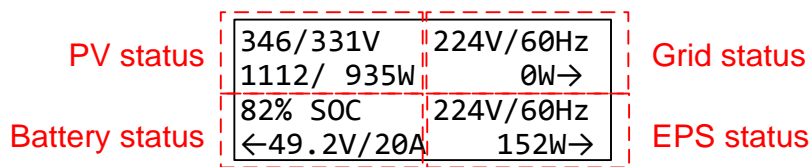


Fig. 5-1 Home page

Meter,

The pages under "Meter", you can see the whole input and output real-time operating condition. Batc / Batd presents battery is under charging / discharging respectively. INVo / INVi presents inverter is feeding / sinking power respectively. Go / Gin presents power is feeding to Grid / sinking from Grid respectively.

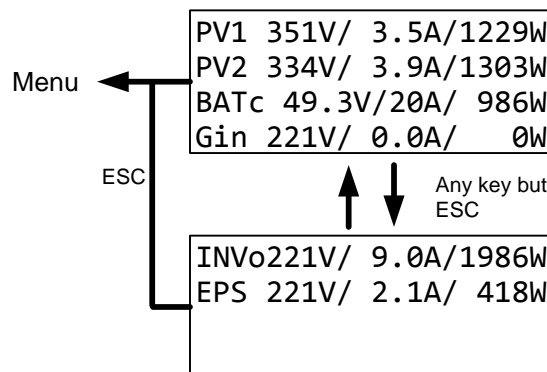


Fig. 5-2 Meter pages

BMS Info.,

Display important information of battery modules(Fig. 5-3).

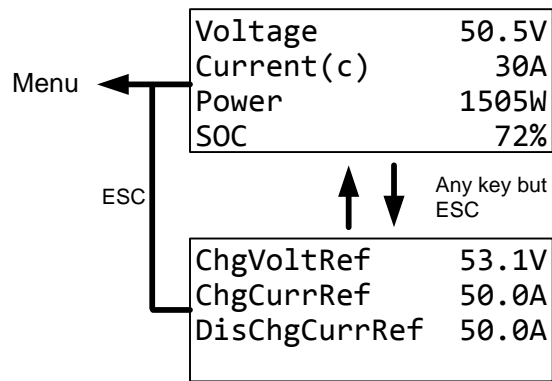


Fig. 5-3 BMS Info. Pages

Energy Log,

In “Today” page, display energy data of,

- PV input 1 / 2
- Battery charge / discharge
- Grid input / output
- EPS output

Press Enter button switch to “Total” page, press again will back to “Today” page.

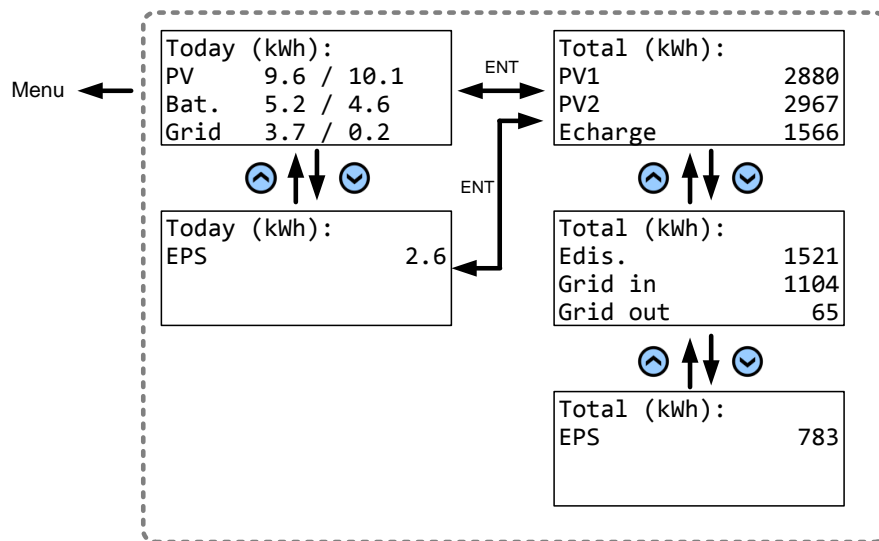
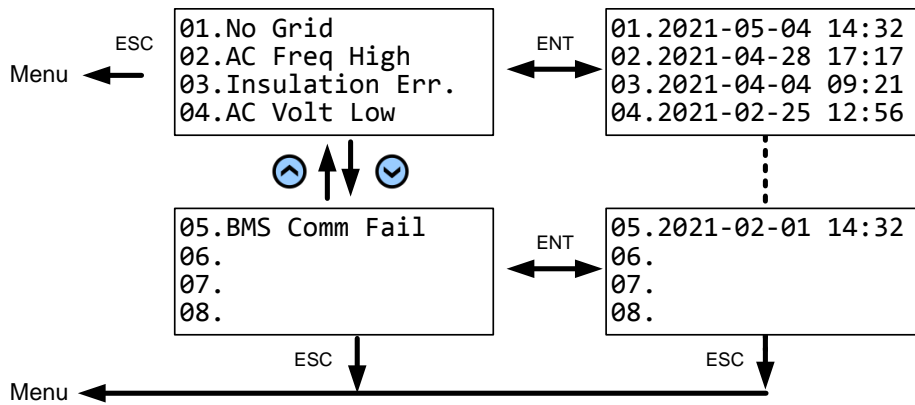


Fig. 5-4 Energy log pages

Event Log,

Display the recorded events, maximum 40 events. Press Enter button will show the happened date and time.



5.2 Page under “Setup”

In Setup, you can set,

- **General:** Includes “Date”, “Time”, “Language”, “RS-485 ID”, “LCD contrast” and “Buzzer” items.

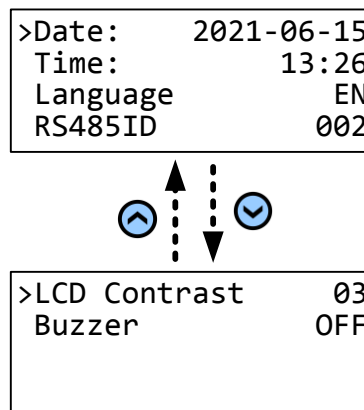


Fig. 5-2 Setup/General pages

- **Grid Parameters:** Need password to adjust the setting. Includes of “Code”, “Detailed”, and “Self Cons.” Voltage, frequency protections, reconnection time, etc. settings can be adjusted in “Detailed” page; CT location and ratio, remaining PV power feed-in Grid or not settings can be adjusted in “Self Cons.” page.

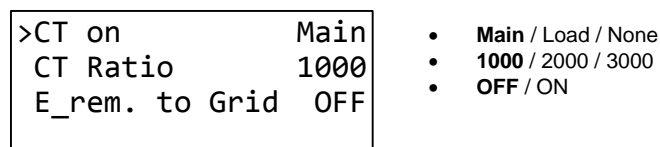


Fig. 5-3 Setup/Grid Parameters/Self Cons. page

- **PV Inputs:** Can set PV strings connection type and energy priority in this page

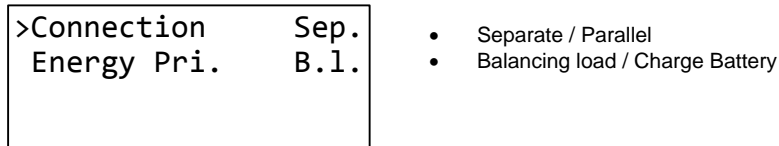


Fig. 5-4 Setup/PV Inputs page

- **Battery:** Includes “Type”, “Max. Charge”, “Max. Discharge”, “EOD Normal”, “EOD Backup”, “AC Charge” and “ Discharge Schedule” items under this page.

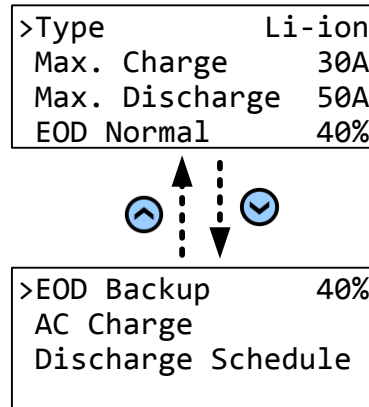


Fig. 5-5 Setup/Battery pages

Type can select “Lead Acid” or “Li-ion”, must correctly set according to the actual installation. If Lead acid (VRLA) is set, have to set up capacity, boost charge voltage and float charge voltage as Fig. 5-6.

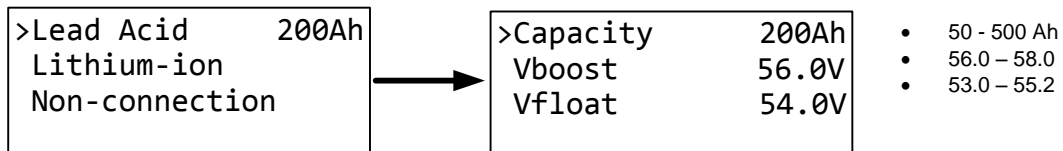


Fig. 5-6 Setup/Battery/Lead Acid pages

If Lithium-ion is set, have to set up BMS protocol.

- **Battery / AC Charge:** Set up AC power charge battery schedule. Normally, hybrid PV inverter only charge battery from PV unless user wants (low electricity price charge battery and use when high price) or battery low for a long time. Must set up the time of start and stop and charge current (Adc from Grid AC power), can set 4 schedules max.

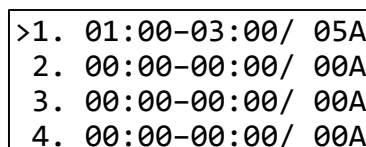


Fig. 5-7 Setup/Battery/AC Charge page

- **Battery / Discharge Schedule:** If PV energy priority is charge first, battery discharge schedule must be set up. During these period, inverter transfer to “Balance Load” mode automatically.

Discharge schedule:	
>No limit	
00:00-00:00	OFF
00:00-00:00	OFF

Fig. 5-8 Setup/Battery/Discharge Schedule page

- **EPS Port:**

- **EPS Port / N Wir.:** Must set up according to the actual EPS N wire connection, can set “Float”, “To G_N (Grid N)” or “To Earth”.
- **EPS Port / AC Bypass:** If user want AC power bypass to EPS port, must turn on this setting and N wire can’t be connected to Earth.
- **EPS Port / Output:** Set the EPS output voltage at backup mode.
- **EPS Port / Frequency:** Set the EPS output frequency at backup mode
- **EPS Port / Parallel:** Parallel setting, “single” presents single unit operation without parallel. “1PM” presents mono phase and master. “3PL1M” presents this device is L1 master of 3 phases connection.
- **EPS Port / Load Type:** If EPS port connects to a 1kW or higher power motor, please set it as “Motor”, inverter would soft start if OCP was triggered. For other type loads, please set it as “Normal”.

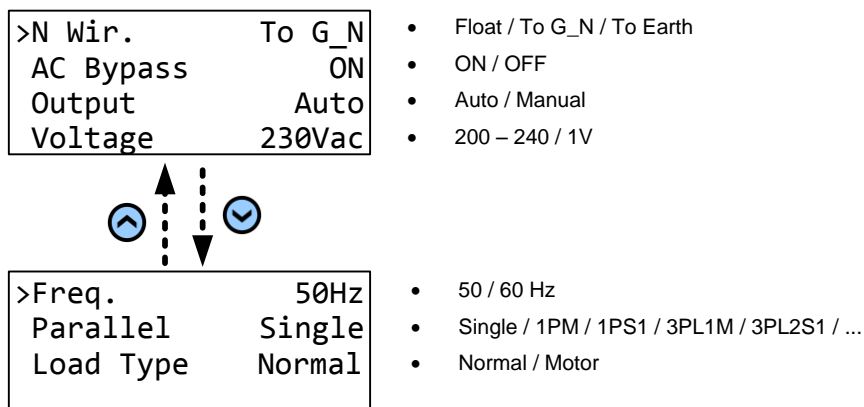


Fig. 5-9 Setup/EPS Port page

- **Turn-off Inverter:** Shutdown inverter after key-in password and confirmed, then, this item will become “Turn-on Inverter”, press again to re-start inverter (don’t need password).

6 Troubleshooting

If any error, warning or fault is occurring, homepage will display the occurring event on the left-top corner (Fig. 5-1). You can refer the following table to do simple troubleshooting.

Error

Code	Error	Cause	What to do
E00	No Grid	AC breaker is off or lose utility power	Check the AC breaker is on. Check AC voltage and frequency are normal.
E01	AC Freq High	AC frequency has over the setting	Check Grid condition. If okay, check the inverter Grid protection settings are meet the Grid condition.
E02	AC Freq Low	AC frequency has under the setting	
E03	AC Volt Hi	AC voltage has over the setting	
E04	AC Volt Low	AC voltage has under the setting	
E19	Bat Reversed	Battery connection is reversed	Correct the battery polarities connection
E20	PV1 Volt Hi	PV1 voltage has over limit	Check the Voc of PV string, must < 550 Vdc at any condition
E21	PV2 Volt Hi	PV2 voltage has over limit	

Warning

Code	Warning	Cause	What to do
W00	PV1 Volt Low	PV1 has under the operating range	It is normal when sunrise, sunset and rainy day. Call service if same fault occurs again in sunny day.
W01	PV2 Volt Low	PV1 has under the operating range	
W08	PW De-rating	Inverter can't output rated power due to temperature or else	Refer to the de-rating curves and check the inverter condition.
W10	Fan Locked	Inner fan is locked or failed	Check the inner fan, replace new one if necessary.
W13	CT Reversed	Installed external CT is reversed	Change the installed CT to correct direction.

W14	CT Disconnected	CT hasn't installed or disconnected	Install CT, check the connection and settings.
W17	Low Batt.	Battery has low capacity	Charge the battery
W18	SOH Low	Battery has bad healthy	Replace the battery with new one

Fault

Code	Fault	Cause	What to do
F01	AC Idc	AC output current has high DC component	Shut down the inverter and re-start. Call service if same fault has occurred several times within a short time.
F05	Temp Low	Low ambient temperature	The inverter would back to operate if ambient temperature back to operating range.
F06	Temp High	High ambient temperature	The inverter would back to operate if cool down.
F07	Tsensor	Temperature sensor is failed	Call service.
F14	FW Not Match	Firmware is not compatible to each other	Upgrade firmware to the last or compatible version.
F15	DSP ADC 1	A/D reading is abnormal	Call service.
F16	DSP ADC 2	A/D reading is abnormal	Call service.
F17	DSP ADC 3	A/D reading is abnormal	Call service.
F18	DSP ADC 4	A/D reading is abnormal	Call service.
F19	Red ADC 1	A/D reading is abnormal	Call service.
F20	Efficiency	Efficiency is abnormal	Call service.
F22	HW COM1	Communication between DSP and Red. Is failed	Call service.
F24	GND Curr.	Residual current has over limit	Shut down the inverter and re-start. Call service if same fault has occurred several times within a short time.
F25	HW RCMU	RCMU circuit is failed	Call service.
F26	Insulation	The equivalent resistance is under limit	May occur during rainy days. Call service if same fault occurs in sunny day.
F28	Rly Short	When driver is off, the relay is still short	Call service.
F29	Rly Open	When driver is on, the relay is still open	Call service.

F31	BUS OVR	BUS has over voltage range	Check the PV voltage <550Vdc. Shut down and re-start the inverter, call service if same fault occurs again.
F42	HW CT Fail	Current sensor is failed	Call service.
F45	AC HW OCP	AC output has over hardware current limit	Shut down and re-start the inverter, call service if same fault occurs again.
F46	Aux PWR Fail	Auxiliary power is failed	Call service.
F48	Manual OFF	The inverter has received OFF command	Check the max. power setting and ON/OFF setting.
F49	Wiring Fault	Grid L and N has reversed connection	Check Grid L and N connection, if both are lines instead of N connect to Ground, please disable the detection.
F52	CAN Fail	CAN communication fail between inverters	Check the parallel connection and settings.
F53	BAT OVR	Battery voltage has over limit	Battery aging or disconnect when charging. Replace battery if aging. Check the battery connection.
F54	BAT UVR	Battery voltage has under limit	Over discharge or battery aging. Replace battery if can't back to normal for a week.
F55	EPS Over Load	EPS power has over limit	Reduce the load power consumption and restart inverter.
F56	EPS Short	EPS port has short circuit	Check the connection, remove the short circuit and restart inverter.
F57	EPS OVR	EPS port has over voltage	Inverter output voltage too high, maybe it is a hardware problem. If can't back to normal after re-starting, call service.
F58	EPS UVR	EPS port has under voltage	Inverter can't output sufficient voltage, maybe it is a hardware problem. If can't back to normal after re-starting, call service.
F60	PV OCR	PV input1 or 2 has triggered over current protection	Shut down and re-start the inverter, call service if same fault occurs again.
F64	Bat Fail	Battery is protected, can't charge, nor discharge.	Wait for few hours, shut down and re-start the battery modules, call service if same fault occurs again.

7 Decommissioning

Procedure

1. Turn off the Battery and AC breakers that connected to the inverter.
2. Turn off the DC switch on the inverter.
3. Disconnect all AC, PV strings, battery wires and communication connections.
4. Remove the clamping plate between inverter and the wall-mounting plate.
5. Lift and remove the inverter from the wall-mounting plate.



WARNING! High voltage inside

Do not open the inverter. Even all power sources are disconnected from the inverter, dangerous voltage may still be present inside.

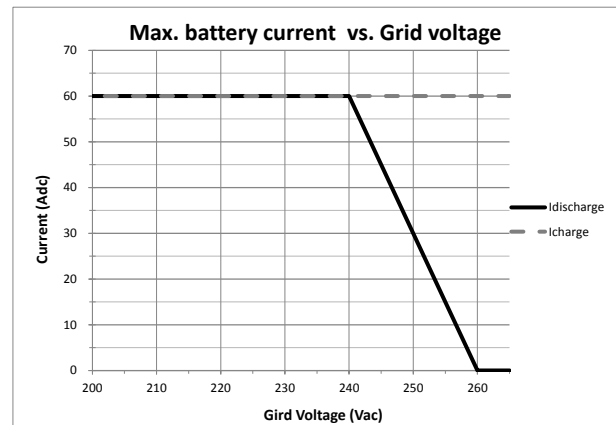
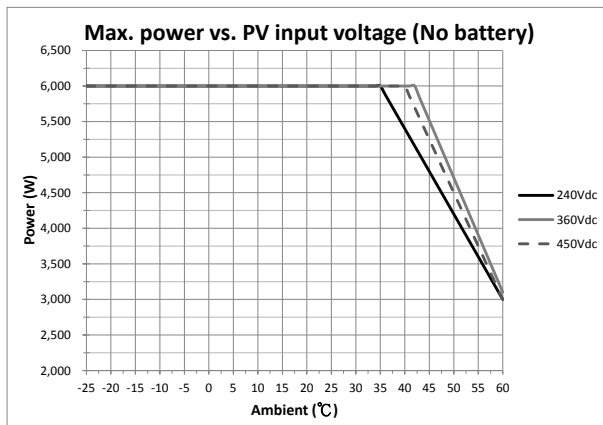
8 Technical Data

8.1 Specification

Model	CPSHB6000ETL48
PV Input	
MPP voltage range (Vdc)	240-500
Maximum input power (Watts)	6300
Maximum PV capacity (Watts)	7800
Maximum input voltage (Vdc)	550
Operating voltage range (Vdc)	80-550
Startup voltage (Vdc)	>100
Number of MPPT	2
Maximum MPPT current (Adc)	13 / 13
Maximum short current (Adc)	16 / 16
Max. backfeed current (A)	0
Grid	
Nominal voltage (Vac)	1PH, 220 / 230
Nominal frequency (Hz)	50 / 60
Maximum output power (W/VA)	6000 / 6100
Maximum output current (Aac)	27.3
Output power factor	≈ 1.0 (-0.9 to +0.9 adjustable)
Output iTHD (%)	< 3%
Max. inrush current (Aac)	42A peak, 0.15ms
Max. fault current (Aac)	130A peak, 0.04ms
Max. over current protection (Aac)	30
Battery	
Nominal voltage (Vdc)	48
Maximum charge current (Adc)	60
Maximum discharge current (Adc)	60
Operating voltage range (Vdc)	42-58
Type	VRLA, Li-ion
EPS Output	
Nominal voltage (Vac)	1PH 220 / 230
Nominal frequency (Hz)	50 / 60
Maximum output power (W/VA)	with PV: 5000 / 5000 without PV: 3000 / 3000
Maximum output current (Aac)	27.3
Overload protection (Watts)	with battery only: 5s at >125% load; 10s at 110-125%
Management & Communications	
LCD panel	20*4 Text LCD display
LED indicator	Green/Orange/Red
Button	ESC/UP/DOWN/ENTER
Communication port	RS-485, CAN, WiFi (Optional)

General	
Topology	PV to Grid: Transformerless Battery to Grid: HF Transformer
Operating temperature (°C)	-25 to +60
Humidity range (%)	0-100 (non-condensing)
Max. Altitude (m)	3000
Efficiency, peak/EU (PV to Grid %/%)	97.7 / 97.3
Weight (kg)	24
Dimensions (WxHxD) (mm)	480 x 472 x 170
Cooling	Natural convection + Inner fan
IP level	IP4X
Protective class	Class I
Overvoltage category	PV: OVC II; AC: OVC III
Certificate	
Safety	IEC 62109-1/-2
EMC	EN 61000-6-2, EN 61000-6-3
Grid code	VDE0126-1-1/A1, UTE C 15-712-1, VFR2019

8.2 De-rating Curves



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